M-STEP 2016 Mathematics

PRESENTED BY:

KYLE WARD

JILL GRIFFIN

2015 DAS FALL Conferences for Assessment and Accountability
Michigan Department of Education

MICHIGAN Department of Education

Mathematics

- Measures concepts and procedures, problem solving, modeling and data analysis, and communicating reasoning

- Includes multiple choice (selected response), technology enhanced (TE) items, short answer and extended response **constructed response** (CR) items
  - Gridded response for paper/pencil testing in lieu of TE items

Mathematics Spring 2015 in Review

- **Transition to assessment aligned to state standards**
  - Increased rigor
  - Focused on college and career ready
  - Provided students with opportunity to show a deeper understanding of what they are learning
  - Established new baseline on which to improve

Mathematics – Spring 2016
What's new

- M-STEP plan - computer adaptive
- MME College Entrance Test – SAT
- Workkeys
- PSAT – Grades 9 and 10 offered (not an accountability measure)
- K-2 Field Test - optional

Mathematics Update (Grade 11)

- SAT-College Entrance Exam
  - Well-aligned to Michigan Mathematics standards
  - Sole M-STEP mathematics score

    (no separate M-STEP in mathematics)

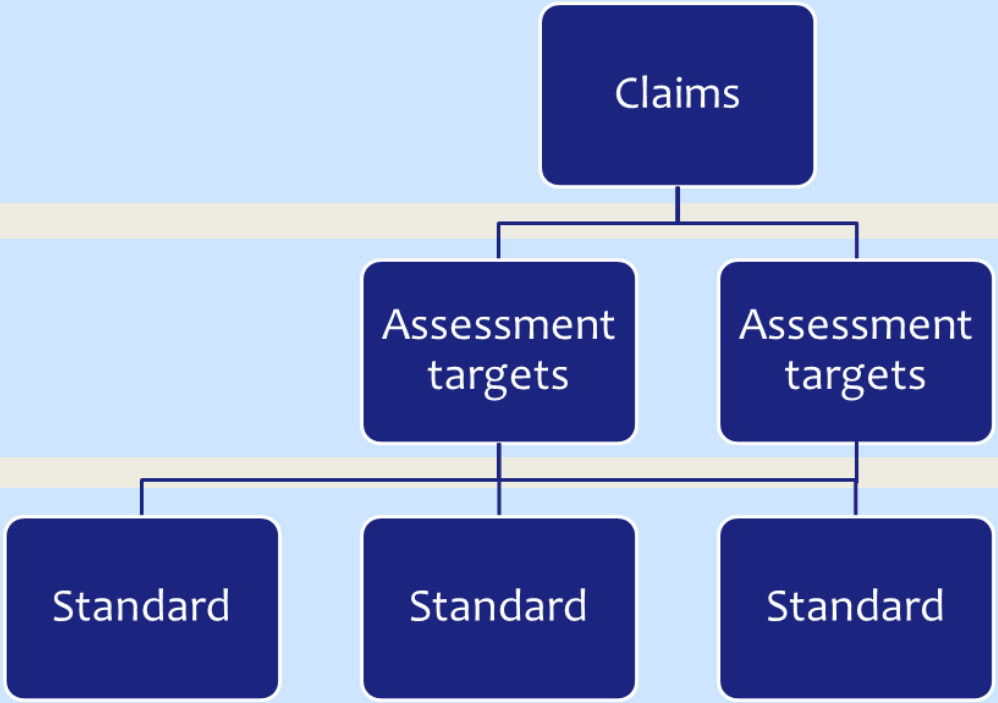
- Work Skills Exam
  - ACT WorkKeys
  - Does not contribute to mathematics score

Claims and Assessment Targets

Claims and Targets

Broad evidence-based statements about what students know and can do

Map the standards onto assessment evidence



Math Claims

Claim #1	**Concepts & Procedures** "Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency."
Claim #2	**Problem Solving** "Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies."
Claim #3	**Communicating Reasoning** "Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others."
Claim #4	**Modeling and Data Analysis** "Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems."

Claims and Assessment Targets

	Claim 1 Concepts and Procedures	Claim 2 Problem Solving	Claim 3 Communicating Reasoning	Claim 4 Data Analysis and Modeling
Grade 3	Targets A-K (Standards clusters)	**Target A:** Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. **Target B:** Select and use appropriate tools strategically. **Target C:** Interpret results in the context of a situation. **Target D**: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas).	**Target A:** Test propositions or conjectures with specific examples. **Target B:** Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. **Target C:** State logical assumptions being used. **Target D**: Use the technique of breaking an argument into cases. **Target E**: Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is. **Target F**: Base arguments on concrete referents such as objects, drawings, diagrams, and actions. **Target G:** At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.)	**Target A:** Apply mathematics to solve problems arising in everyday life, society, and the workplace. **Target B**: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. **Target C:** State logical assumptions being used. **Target D:** Interpret results in the context of a situation. **Target E**: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. **Target F**: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). **Target G:** Identify, analyze and synthesize relevant external resources to pose or solve problems.
Grade 4	Targets A-L (Standards clusters)			
Grade 5	Targets A-K (Standards clusters)			
Grade 6	Targets A-J (Standards clusters)			
Grade 7	Targets A-I (Standards clusters)			
Grade 8	Targets A-J (Standards clusters)			
HS	Targets A-P (Standards clusters)			

Claims-Targets-Standards Crosswalk

		Mathematics Grade 3	
Claims	Critical Areas	Targets	Standards
Claim 1: Concepts and Procedures Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.	Developing understanding of multiplication and division and strategies for multiplication and division within 100	**Target A:** Represent and solve problems involving multiplication and division.	3.OA.1 3.OA.2 3.OA.3 3.OA.4
		Target B: Understand properties of multiplication and the relationship between multiplication and division.	3.OA.5 3.OA.6
		Target C: Multiply and divide within 100.	3.OA.7
		Target D: Solve problems involving the four operations, and identify and explain patterns in arithmetic.	3.OA.8 3.OA.9
		Target E: Use place value understanding and properties of operations to perform multi-digit arithmetic.	3.NBT.1 3.NBT.2 3.NBT.3
	Developing understanding of fractions, especially unit fractions (fractions with numerator 1)	**Target F:** Develop understanding of fractions as numbers.	3.NF.1 3.NF.2 3.NF.3
	Developing understanding of the structure of rectangular arrays and of area	**Target I:** Geometric measurement: understand concepts of area and relate area to multiplication and to addition.	3.MD.5 3.MD.6 3.MD.7 3.OA.5 3.G.2
		Target J: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.	3.MD.8
	Describing and analyzing two-dimensional shapes	**Target K:** Reason with shapes and their attributes.	3.G.1 3.G.2
	Supporting Clusters	**Target G:** Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	3.MD.1 3.MD.2
		Target H: Represent and interpret data.	3.MD.3 3.MD.4

National Council Teachers of Mathematics (NCTM)

"…the best preparation for the [mathematics] assessments, with their commitment to assessing all the standards, including the Standards for Mathematical Practice, is high-quality instruction…"

NCTM President Diane J. Briars

Claim 2, 3, and 4 Relevant Verbs

Claim 2 Problem Solving	Claim 3 Communicating Reasoning	Claim 4 Modeling & Data Analysis
Understand	Understand	Model
Solve	Explain	Construct
Apply	Justify	Compare
Describe	Prove	Investigate
Illustrate	Derive	Build
Interpret	Assess	Interpret
Analyze	Illustrate	Estimate
	Analyze	Analyze
		Summarize
		Represent
		Solve
		Evaluate
		Extend
		Apply

Classroom Connections

- Aligned instruction to content standards, including depth of knowledge, academic vocabulary, and performance tasks
- Familiarity with testing devices, item types/interactions, online delivery engine tools, navigation, and functionality (look and feel)
- Sample item sets – Technology Enhanced (TE) item types, online navigation, and tool functionality – *classroom led for younger students*

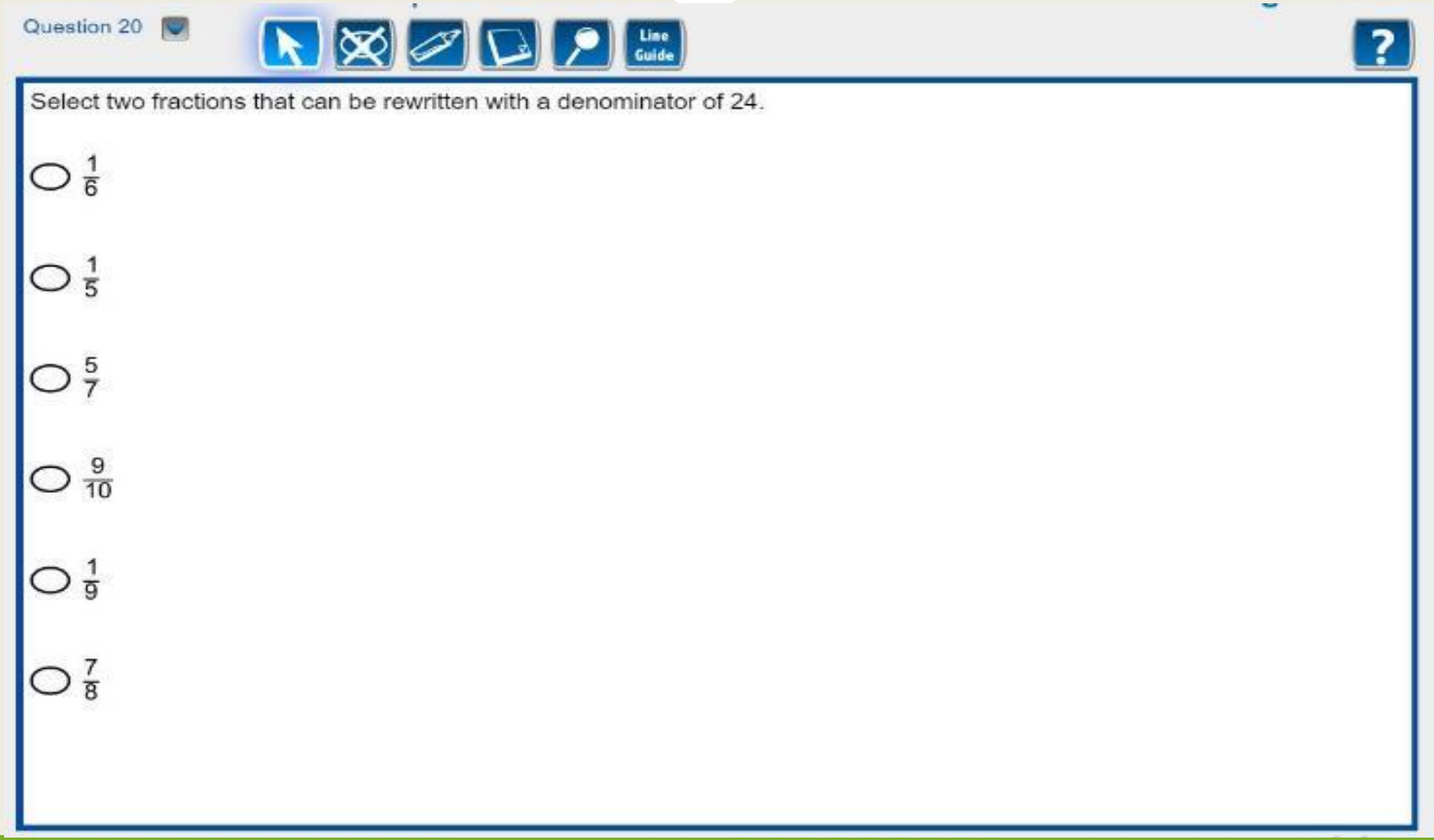
Be Prepared!

SAMPLE ITEM SETS

- ALL GRADE LEVELS, 3-8 & 11
- COMPUTER ADAPTIVE TEST (CAT) ITEMS AND PERFORMANCE TASKS

HTTPS://WBTE.DRCEDIRECT.COM/MI/PORTALS/MI/OTT1

Sample TE Item Type - Multi-Select



Multiple Answer

Mathematics Grade 3 Sample Items

Training

Question 2

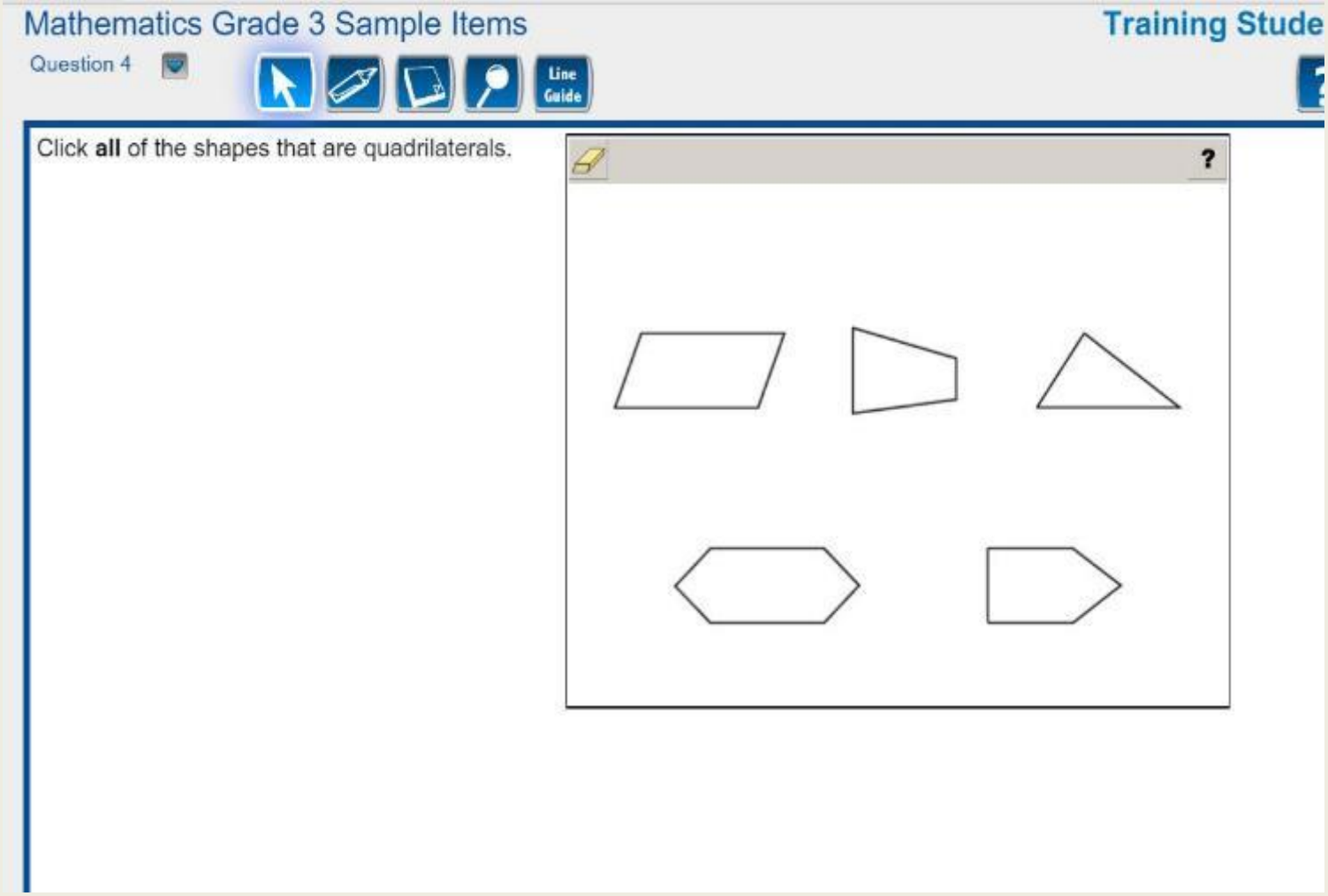
Line Guide

Does replacing the unknown number with 7 make each equation true? Select Yes or No for each equation.

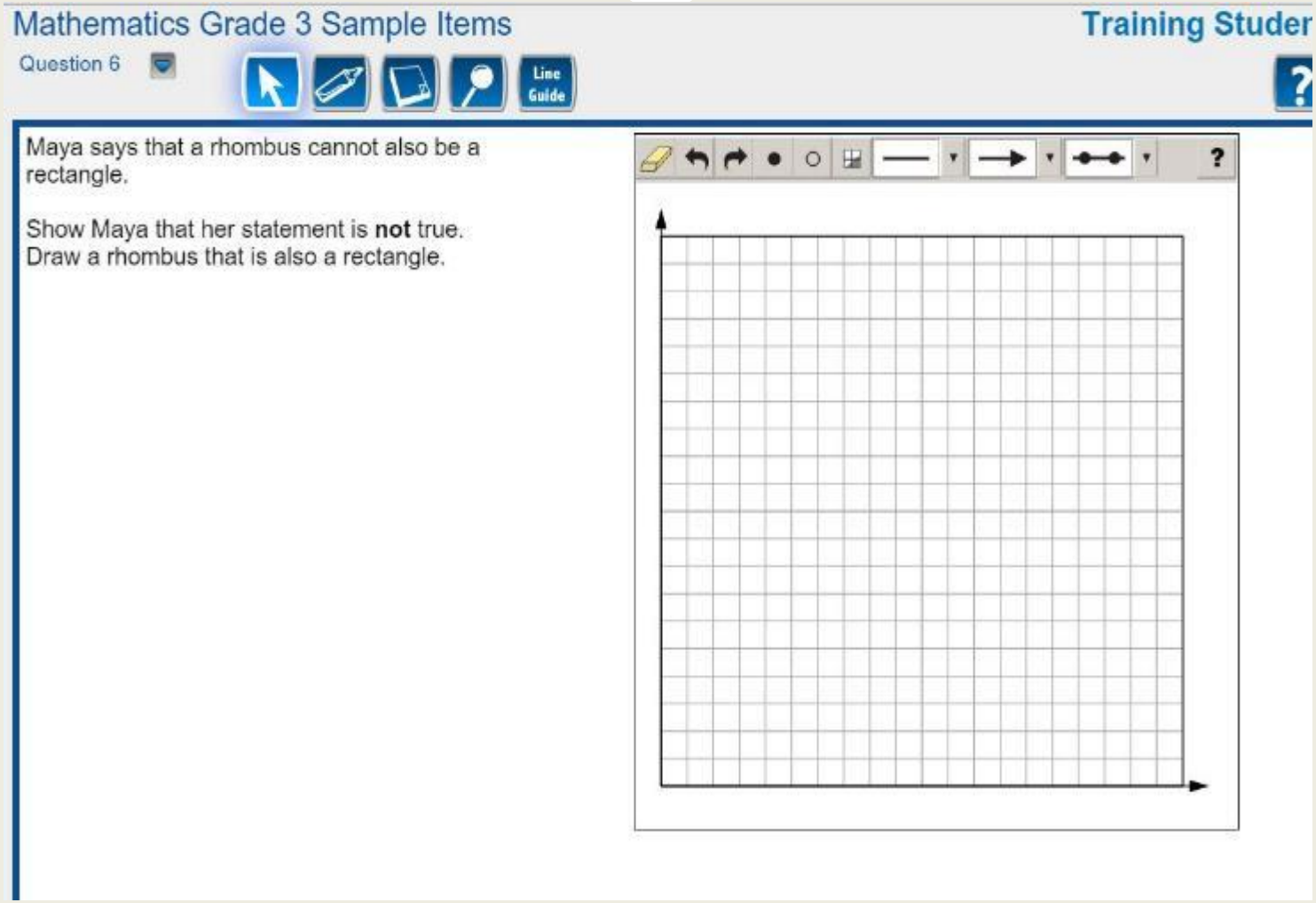
?

	Yes	No
6 × ☐ = 36		
8 × ☐ = 64		
49 ÷ ☐ = 7		
54 ÷ ☐ = 6		

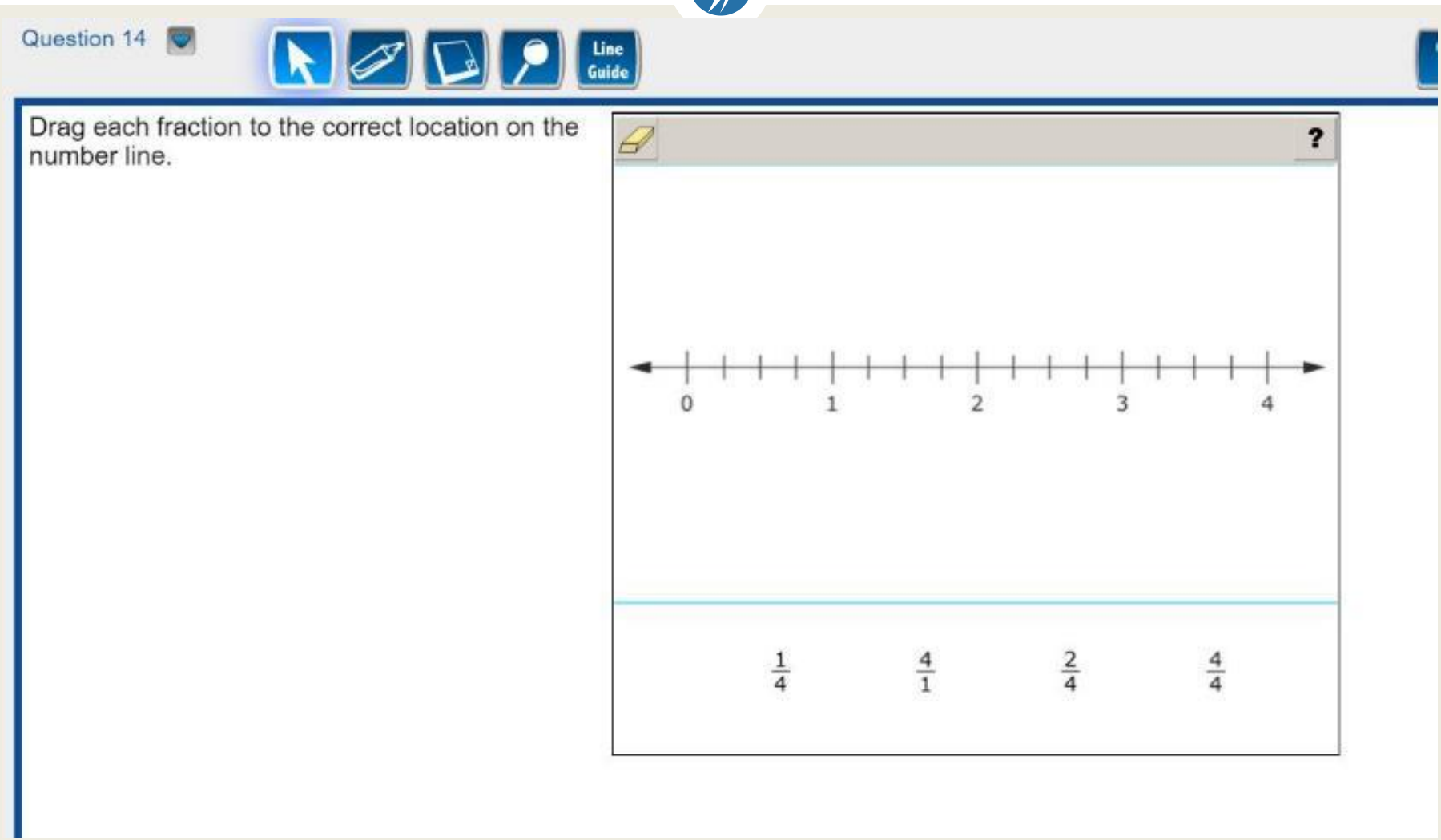
Hot Spot


Mathematics Grade 3 Sample Items
Training Stude
Question 4
Line Guide
Click **all** of the shapes that are quadrilaterals.
?

Graphing


Mathematics Grade 3 Sample Items
Training Studer
Question 6
Line Guide
Maya says that a rhombus cannot also be a rectangle.
Show Maya that her statement is **not** true.
Draw a rhombus that is also a rectangle.

Drag and Drop



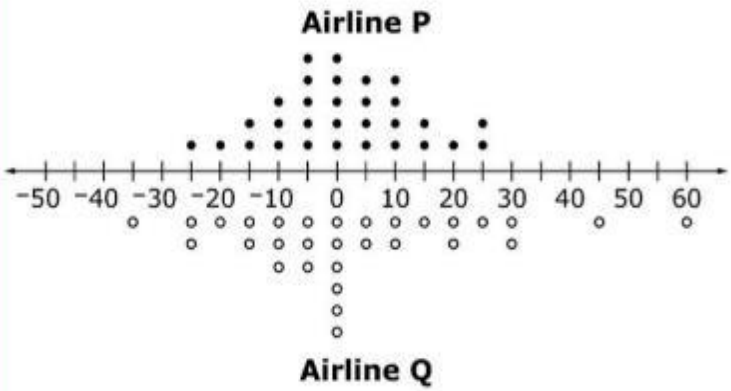
Constructed Response

Mathematics Grade 11 Sample Items

Training Student

Question 18

The dot plots below compare the number of minutes 30 flights made by two airlines arrived before or after their scheduled arrival times.



- Negative numbers represent the minutes the flight arrived before its scheduled time.
- Positive numbers represent the minutes the flight arrived after its scheduled time.
- Zero indicates the flight arrived at its scheduled time.

Assuming you want to arrive as close to the scheduled time as possible, from which airline should you buy your ticket? Use the ideas of center and spread to justify your choice.

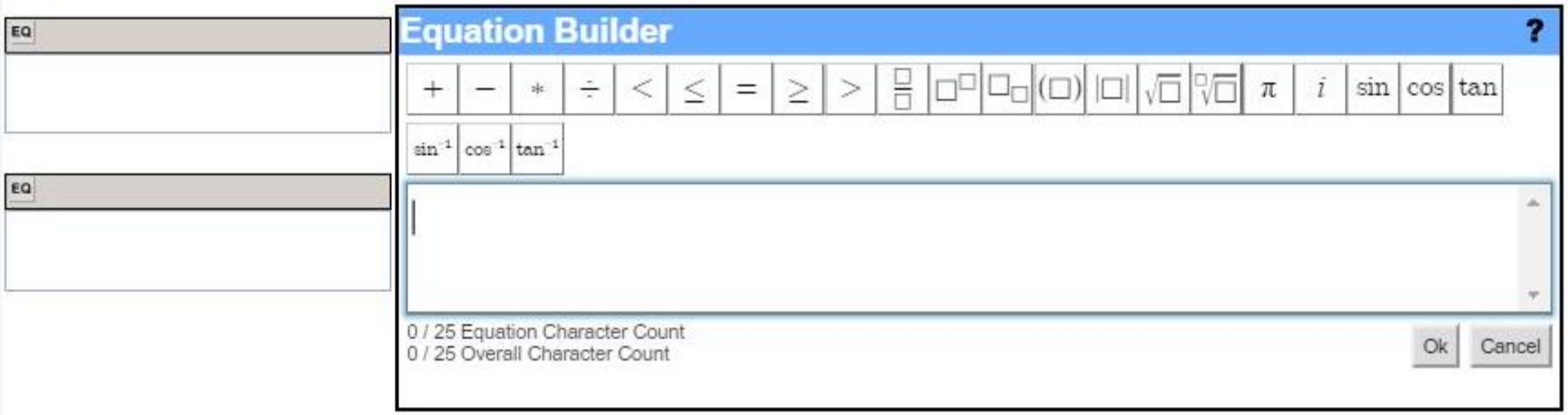
Review/End Test | Pause | Flag | Back | Next

Item Requiring Equation Builder

Solve the following equation for *n*.

$18n^2 - 50 = 0$

Enter one solution in the first box. If there are two solutions, enter the second solution in the second box.



Spring 2016 Equation Builder

- Instead of an open-entry text box with an “EQ” button, students will enter their responses to these types of items by clicking on buttons provided in a pre-established keypad.
- The keypad will offer the same sort of entry opportunities as our former “EQ” button, however the student will be limited to the buttons provided in the keypad.

Spring 2016 Equation Builder

- The student will no longer have to open a separate window to use an equation builder.
- The student will be limited in the keyboard by what they see in the buttons.
- The buttons will be organized by functionality (e.g., operators).
- There will be specific variable buttons on the keypad.
- Practice with tool in fall 2015

M-STEP Online

- **80%** of Schools – Online
- **83%** of Student Population was Covered
- **3.8 million** Test Sessions
- **190,731** Sessions in a Single Day
- **97%** Participation Rate Overall

Instructional Resources

- Illustrative Mathematics
  - http://www.illustrativemathematics.org/
- MARS
  - http://map.mathshell.org/materials/index.php
- EduCore
  - http://educore.ascd.org/
- NCTM's Illuminations
  - http://illuminations.nctm.org/
- Michigan e-Library
  - http://mel.org

Get Involved!

Please encourage the teachers in your district to participate on DAS Committees.

www.michigan.gov/baa

"Assessment Committee Participation Application"

Item Writing

Item Review

Data Review

Context Review

Standard Setting

Stay Informed!

Sign up for weekly distribution of the *Spotlight*.

www.michigan.gov/baa

"Communications and Spotlight… "

Reach Out!

KYLE WARD
Mathematics Consultant
Office of Standards and Assessment
wardk2@michigan.gov
(517) 335-0907

JILL GRIFFIN
Urban Education Consultant
Office of Educational Improvement and Innovation
Curriculum and Instruction Unit
griffinj9@michigan.gov

Thank you!